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ABSTRACT

This report contains a study done at the request of the Wisconsin Policy Research Institute, which studies public policy issues affecting the state of Wisconsin. The purpose of this study was to examine the content of environmental education (EE) materials used in courses required for teacher certification in Wisconsin to see if the knowledge and skills needed to deliver balanced, unbiased environmental education are provided. This report examines the course materials used in required EE courses taught at eight of the University of Wisconsin System campuses that have specified EE courses that meet the Wisconsin requirements for certification. Course syllabi, textbooks, and required readings and materials were reviewed using guidelines developed by the North American Association for Environmental Education (NAAEE). Specifically, NAAEE's Guidelines for Excellence are cited as calling for fairness and accuracy. It is noted that the Guidelines caution instructors to compensate for biased material by using other materials that provide a different or more complete perspective. Findings indicate that most of the materials reviewed do not meet the Guidelines for fairness and accuracy. Many of the materials provide a strong dose of advocacy under the guise of environmental science as to lifestyle changes and political action. The science portions are selective with authors using those scientific findings that support their larger worldview. Although these materials claim to be multidisciplinary with the inclusion of economics, a balanced and fair treatment of economic reasoning is largely nonexistent. It is recommended that textbooks that place advocacy of an ideological view above teaching balanced science and economics should not be used or at least be balanced with alternative views. (PVD)

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Wisconsin Policy Research Institute Report

November 1997 Volume 10, Number 7

TEACHING ENVIRONMENTAL EDUCATION TO WISCONSIN TEACHERS

A Review of University Course Materials

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REPORT FROM THE PRESIDENT:

Two years ago, we asked Dr. Michael Sanera — a nationally known expert in evaluating environmental education programs — to come to Wisconsin as a visiting fellow to examine this issue. Dr. Sanera is currently the director of the Environmental Education Resource Center in Tucson, Arizona, part of the Denver-based Center for the New West. His recently released book, *Facts Not Fear: A Parent's Guide to Teaching Children About the Environment*, in its seventh printing, has been enthusiastically received across the United States. He is now recognized as one of the top experts in the country on environmental education.

Last year, Dr. Sanera examined environmental education based on what our children were being taught in public schools throughout Wisconsin. This report is a natural follow-up, in which he examines what our teachers are being taught about environmental education before they enter the classrooms.

Under the *Wisconsin Administrative Code*, all students who want to earn a teaching certificate for the first time must complete a course in environmental education. Therefore, the question is logically raised: are they being prepared in an unbiased way to teach our children? The answer is not encouraging. His report paints a picture of ideology replacing science in terms of preparing teachers to instruct our children. Environmental education should begin to prepare children to accumulate scientific facts about their world, not to be blindly ideologically driven.

It is clear from this study that the direction being followed in a number of textbooks being used is one toward dogma rather than unbiased knowledge. This issue also raises a more compelling argument that in many instances, the schools of education in our state are more interested in ideology when putting textbooks and curriculum together than they are in facts and an unbiased approach. Environmental education should be a positive tool in Wisconsin so that our children have a balanced view of the world. Once again, we stress that our children should be educated, not indoctrinated, so that they will respect and not fear the world in which they live.

James H. Miller

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TEACHING ENVIRONMENTAL EDUCATION TO WISCONSIN TEACHERS

A Review of University Course Materials

MICHAEL SANERA

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EXECUTIVE SUMMARY

Wisconsin is known nationally as a leader in environmental education (EE). This reputation is earned by having one of the most comprehensive EE programs in the nation. Included in this program is a requirement to teach prospective teachers about the environment, so that they can fulfill their responsibility to teach EE to their kindergarten through 12th-grade students.

This report evaluates university-level course materials used to teach prospective teachers about the environment. Materials from 12 courses offered by eight University of Wisconsin System campuses — Eau Claire, Green Bay, La Crosse, Madison, Milwaukee, Stevens Point, Superior, and Whitewater — are compared to educational standards for accuracy and fairness. The standards used are guidelines recently established by the nation's largest association of professional environmental educators, the North American Association for Environmental Education (NAAEE).

Published in November 1996, the NAAEE *Environmental Education Materials: Guidelines for Excellence* establish nationwide standards for evaluating EE materials. These *Guidelines* require that materials present information that is factually accurate and balanced. Quality EE materials must cover "differences of opinion or competing scientific explanations" and "should encourage learners to explore different perspectives and form their own opinions."

When the materials from the 12 courses reviewed in this study are compared to the NAAEE *Guidelines*, two of them meet the guidelines with qualifications (Eau Claire and Madison), seven of them fail to meet the guidelines (Green Bay, Madison, Milwaukee, Stevens Point, two courses at Superior, and one at Whitewater), and three of them use materials that contain uneven information resulting in an inconclusive evaluation (two at La Crosse and one at Whitewater).

This study finds that:

1. Many materials mislead prospective teachers by mixing science with advocacy.

2. The science presented as environmental science in many of these materials is often the selective use of scientific information to lead future teachers to predetermined conclusions.

3. Even though these materials claim to be multidisciplinary, with the inclusion of economics, a balanced and fair treatment of economic reasoning is largely nonexistent in them.

4. Normal standards of scholarship, which require citations for data and opinions taken from other sources, are almost entirely missing from these teacher education materials.

5. These EE materials largely fail to transmit to prospective teachers the educational responsibility and ethics for educating, rather than propagandizing, students.

Recommendations

State officials responsible for and interested in balanced EE should transmit to university officials clear expectations regarding that which is acceptable and that which is unacceptable environmental education. For example, textbooks that place advocacy of an ideological view above teaching balanced science and economics should not be used or should at least be balanced with alternative views. Clearly stated standards, such as the NAAEE *Guidelines* for "Fairness and Accuracy," should be adopted to govern EE teacher education courses. (Arizona has adopted these *Guidelines* as guidance for its EE grant programs.) Political advocacy for particular environmental policy outcomes, without alternative perspectives, should not be part of responsible teacher training in environmental education.

ACKNOWLEDGMENTS

The author recognizes two individuals who helped in countless ways to bring this report to fruition. **Marcia Sielaff** provided essential research, writing, and editing assistance for this project. She labored tirelessly over mounds of books, reports, and textbooks documenting the trends in this report. **Amy Price** had the sometimes frustrating job of tracking down and securing the textbooks and other materials used in the courses reviewed. This report benefits from her attention to the details of the course materials and footnotes. Of course, any errors or omissions are the responsibility of the author.

INTRODUCTION

Wisconsin citizens place a high priority on teaching children about the environment. To support this priority, state lawmakers enacted legislation to establish a comprehensive environmental education program.[1] These laws provide key structural, programmatic, and funding elements. One of the most important elements is the requirement to prepare prospective teachers to teach environmental education.

Under the *Wisconsin Administrative Code*, all prospective teachers applying for their initial teacher certification must complete a course in environmental education. This includes students who plan to become teachers in early childhood, elementary, agriculture education, and secondary science and social studies (except for philosophy, psychology, and religious studies). Since 1985, Wisconsin's administrative rules have required that "adequate preparation in conservation of natural resources is required for a license to teach ...."[2]

Prospective teachers must demonstrate competencies in seven areas to meet environmental education certification requirements. Two of these seven areas include knowledge of natural resources and methods of conserving them, and knowledge of the concept of energy. Articles and reports show that two other areas included in this list of seven have sparked controversy around the country.[3] Wisconsin teachers are to be trained in "methods to examine attitudes and values inherent in environment problems" and teaching "ways in which citizens can actively participate in the resolution of environmental problems."[4]

Unfortunately, these well-intentioned goals become controversial when educators go beyond objective examination of attitudes and values thought to be associated with environmental problems, and they instead consciously set out to manipulate and change values and attitudes in predetermined ways. In addition, parents complain when students are encouraged to initiate "environmentalist" political actions by writing elected officials to promote or oppose legislation, raise money for environmental causes, or write letters to the editors of newspapers. As a result, environmental education has become controversial, rightly or wrongly, by being associated with environmental activism.

Purpose of this Study

The purpose of this study is to examine the content of environmental education materials used in courses required for teacher certification in Wisconsin to see if the knowledge and skills needed to deliver balanced and unbiased environmental education are provided.

Analysis of University Teacher Environmental Education Course Materials

In order to evaluate the content of teacher education about the environment, this report examines the course materials used in required EE courses taught at eight of the University of Wisconsin System campuses that have clearly specified an EE course or courses that meet the Wisconsin requirements for certification. Course syllabi, textbooks, and required readings and materials were reviewed to evaluate the EE preparation that new teachers receive.

The guidelines developed by the largest association of professional environmental educators, the North American Association of Environmental Education (NAAEE) were used to assess the teachers'-course materials.

The Association's *Environmental Education Materials: Guidelines for Excellence*, published in November 1996, establishes nationwide standards for the evaluation of environmental education materials.[5] These guidelines help educators, curriculum designers, materials developers, and others to evaluate existing materials and to develop new, high-quality EE materials. Specifically, the *Guidelines* "offer a way of *judging the relative merit of different* [existing] materials, a standard to aim for in developing new materials and a set of ideas about what a well-rounded environmental education curriculum might be like"[6] (emphasis added). The *Guidelines* note that even if a material does not measure up to these standards, it may still be used. However, instructors are cautioned to compensate for the weakness by the way they use the material. This means, for example, that instructors are encouraged to compensate for a biased material by using other materials that provide a different or more complete perspective.

The NAAEE *Guidelines* point out six "key characteristics" that high-quality EE materials should exhibit. These include "usability, emphasis on skills building, and depth." The first key characteristic that any quality EE material must have is "Fairness and Accuracy." In defining this characteristic, the *Guidelines* state in part:

> **Fairness and Accuracy**
>
> Environmental education materials should be fair and accurate in describing environmental problems, issues and conditions and in reflecting the diversity of perspectives on them.
>
> 1.1) **Factual accuracy.** Environmental education materials should reflect sound theories and well-documented facts about subjects and issues ....
>
> **What to look for:** Data are drawn from current and identified sources of information .... Factual information is presented in language appropriate for education rather than for propagandizing ....
>
> 1.2) **Balanced presentation of differing viewpoints and theories.** Where there are differences of opinion or competing scientific explanations, the range of perspectives should be presented in a balanced way ....
>
> **What to look for:** Scientifically and socially credible positions and explanations are covered thoroughly, while other positions are also mentioned. (Balanced presentation does not mean giving equal time and space to every opinion or perspective, but treating major positions fairly.) ...
>
> 1.3) **Openness to inquiry.** Materials should encourage learners to explore different perspectives and form their own opinions ....
>
> **What to look for:** Materials encourage an atmosphere of respect for different opinions and an openness to new ideas ....[7]

This first characteristic provides a basis for evaluating the content of EE materials. University course materials used to educate future teachers are compared to this Fairness and Accuracy characteristic. The primary focus of this study is on the central textbook assigned for each course, but course readings, course outlines, and the course syllabi are also reviewed.

Of course, any college course is more than the assigned reading materials. Lectures, exams, and student questions and discussion all contribute to the learning process. Short of attending all the lectures and class sessions, any evaluation is limited. On the other hand, a review of the assigned reading materials, especially the primary textbook, reveals a great deal about the course content. Any course that strives to provide balanced and objective coverage should provide readings that support that objective.

In addition, a particular course is only a "snapshot" in time. The course reflects decisions by a particular instructor regarding the appropriate content as represented in the text, readings, lectures, and exams. The information transmitted to students changes over time and by decisions made by different professors. Information in this report reflects only this "snapshot" for the particular course materials reviewed.

COURSE MATERIALS EVALUATION

This report consists of the school-by-school, course-by-course evaluations that follow. (Schools are listed in alphabetical order.) The eight University of Wisconsin campuses have chosen different approaches for students to comply with the EE requirement. Some have decided on one course, others allow students to select from a list of courses. Still others require a sequence of two courses. These differences reflect decisions made at each of the campuses based on their consideration of the certification requirements and of student needs.

A summary of the course materials reviewed by this study appears on the next page.

Before beginning this evaluation, I note that only one text — *Environmental Economics*[8] — out of a total of nine standard textbooks reviewed for this study provides students with standard academic citations for the facts and opinions expressed. Education students using the other eight textbooks are unable to review the sources of information and to engage in critical thinking about various environmental controversies. In addition, this practice sets a bad example for students who are expected to cite sources in their own college-level, written work. One author states that he consulted 10,000 sources, but he has decided that providing students with specific citations "would interrupt the flow of material."[9] However, the standards of scholarship require citation of sources and these standards apply to textbook authors, professors, and students alike.

UW-EAU CLAIRE

CI 308 Science Curriculum and Instruction in Grades 1-9

At UW-Eau Claire, the course "Science Curriculum and Instruction in Grades 1-9" is required of all education majors. This course is unique among those reviewed for this study — because it is not a course solely dedicated to EE, but a science course that contains "an environmental education component."[10] Thus, its primary aim is to instruct teachers on how to teach children about science. The course assumes that the primary base of knowledge that teachers need to teach EE is science. As will be discussed below, this is not the usual assumption of many of the other EE courses taught in the UW System.

This course uses three books. The first book, *National Science Education Standards*, is a report published by the National Research Council.[11] The Council is a distinguished research organization organized by the National Academy of Sciences. This book outlines a curriculum intended to enable the United States to reach the "goal that all students should achieve scientific literacy."[12] According to the introduction, the science standards contained in this report are to serve as a guide for planning science education. Along with related topics, the *Standards* outline what teachers and students should know and be able to do over the course of a 12-year education.

This book touches only tangentially on environmental topics such as pollution, species extinction, and world-population growth. The main focus is on science education. Prospective teachers who develop their EE lesson plans from these *Standards* will be advancing both scientific and environmental literacy.

While the report issued by the National Research Council does not directly provide environmental education content and, therefore, does not directly relate to the NAAEE *Guidelines*, it does satisfy the basic standards of fairness and accuracy demanded by both science and the NAAEE *Guidelines*.

The second book assigned for this course is *Young Child as Scientist*, by Christine Chaille and Lory Britain.[13] It also does not directly address environmental education as a primary topic. It concentrates on science education for very young children, using the "constructivist approach." This approach broadly defines a scientist as "anyone who is studying anything in a methodical way."[14] This constructivist approach downplays content (learning scientific facts) and stresses the process of science, but not the formal scientific method. Instead, young children are to learn science through "play."[15] While some might question a possible over-emphasis on process over content, the goal is to stimulate scientific interest in children.

Engaging Children in Science, by Ann Howe and Linda Jones, is the third book used in this course, and it

A COMPARISON OF WISCONSIN UNIVERSITY COURSE MATERIALS TO THE NAAEE *GUIDELINES* FOR FAIRNESS AND ACCURACY

		Course Materials Meet *Guidelines*, with Qualifications	Course Materials Uneven or Mixed; Evaluation is Inconclusive	Course Materials Do Not Meet *Guidelines*
UW-Eau Claire				
CI 308	Science Curriculum and Instruction in Grades 1-9	X		
UW-Green Bay				
ED 203	Introduction to Environmental Education			X
UW-La Crosse (two-course sequence required)				
GEO 200	Conservation of Global Environments		X	
and				
CI 381/581	Environmental Education Methods		X	
UW-Madison				
ECON 343	Environmental Economics	X		
or				
GEOG 120	Global Physical Environments			X
UW-Milwaukee				
CURR INS 326	Environmental Education for Teachers			X
UW-Stevens Point				
NRES 370/570	Introduction to Environmental Study			X
UW-Superior				
BIOL 100	Environmental Science			X
or				
BIOL 123	Concepts in Biology			X
UW-Whitewater				
BIOL 214	Ecology and Society			X
or				
GEOG 252	Human Environmental Problems		X	

also uses the constructivist approach as its method of teaching children about science. Here, the constructivist approach is described as building on the knowledge that children bring with them to class. The text discusses age-appropriate methods of instruction, classroom-management techniques, instructional objectives, and other teacher tools and strategies.[16]

By concentrating on science education, this course is unique among those reviewed for this report. On one

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hand, it does not formally meet the NAAEE *Guidelines* — because its focus is science education, not environmental education. On the other hand, it indirectly applies the NAAEE principles of fairness and accuracy to science education, thus providing a foundation for environmental education based on "sound theories and well-documented facts about subjects and issues." Thus, this course can be said to satisfy the intent of the NAAEE *Guidelines*. This course, therefore, meets the NAAEE *Guidelines*, with the qualifications stated above.

UW-GREEN BAY

ED 203 Introduction to Environmental Education

At UW-Green Bay, the course "Introduction to Environmental Education" is required for all students who major in early-childhood education, elementary education, elementary/middle school education, and all science and social studies at both the middle and secondary levels.[17]

The instructor for this course has developed an extensive 20-page syllabus for her students.[18] This syllabus describes a problem-centered curriculum. According to the syllabus, the first "characteristic of environmental education" is "problem-solving and issue-centered education."[19] Eleven other characteristics follow, among them that EE should be concerned with "attitudes and values, as well as facts, concepts and 'understandings'" and "[l]earnings that promote cooperation amongst people and groups, governments and agencies in the evaluation of issues and the solving of environmental problems."[20] As noted above, these are the areas that produce so much controversy in the EE field.

Included in the syllabus is a "selected list of non-governmental organizations concerned with future environments for people and other living things" and the suggestion, "Why not join one or more and add your time, talents and money to their efforts?"[21] The list includes Greenpeace, Environmental Action, Common Cause, and the Environmental Defense Fund. Many of the organizations listed are not educational organizations, but activist ones with narrow political agendas. Other organizations that favor alternative approaches to solving environmental problems are not listed.

This course requires two books. The first is Aldo Leopold's *A Sand County Almanac*.[22] Leopold's book expresses a legitimate point of view that teachers and students should know and understand. In this book, he views man as a spoiler and unwelcome intruder in the natural world. He writes:

> Like winds and sunsets, wild things were taken for granted until progress began to do away with them. Now we face the question whether a still higher "standard of living" is worth its cost in things natural, wild, and free. For us of the minority, the opportunity to see geese is more important than television, and the chance to find a pasque-flower is a right as inalienable as free speech.[23]

Leopold's writing about nature, although poetic, represents a single point of view. This view is one of many that teachers should know and teach their students. As noted below, other materials required for this course do not balance his view. Thus, the use of this book alone — without materials that give alternative views — does not satisfy the NAAEE *Guidelines*, which call for a "balanced presentation of differing viewpoints and theories."

The second book used in this course is *Ten-Minute Field Trips: A Teacher's Guide to Using the Schoolgrounds for Environmental* Studies, by Helen Ross Russell.[24] This book provides teachers with information on plants, animals, physical science, earth science, and interdependence. In each of these areas, Russell provides background information for field trips. For example, under the section on trees, Russell provides information on tree bark, leaves, flowers, and fruit. Then a list of field-trip possibilities is offered, such as: 1.) "Make a study of tree flowers in the spring;" and, 2.) "Select a tree to visit repeatedly. Observe and record changes."[25] For the most part, this aspect of the book is based on sound science, and the field trips offer children the opportunity to learn about nature.

Unfortunately, the book also engages in editorializing directed towards teachers. The author makes such one-sided statements as "mass poisoning of the air and water cannot be ignored indefinitely,"[26] "250 years of care-

less cutting, slashing, and burning [of US forests] brought us [Americans] to the Pacific [Ocean]" and "[w]e must somehow stop our [human] population spiral before we, like the deer of the Kaibab and Isle Royale, totally destroy our environment — the ecosystem, Earth."[27]

In order to achieve the balanced view required by the NAAEE *Guidelines*, prospective teachers need to know that these statements are Russell's interpretation of the factual historical record. They should also know that there are views based on different readings of that record. For example, many scientists would not agree with the statement that we have engaged in the "mass poisoning of the air and water." We have severely polluted specific areas — but, at least in United States, air and water quality are improving.[28]

Additionally, many economists would disagree with characterizing the cutting of U.S. forests as "careless." In fact, it was quite purposeful. Forests were cut to build factories, homes, and railroads and to fuel the early industrialization of the country. Starting in about 1920 — when the nation switched to alternatives, such as steel and cement for construction and oil and coal for fuel — U.S. forests have made a dramatic recovery. Since the early 1950's, we have grown more timber than we've cut.[29]

Equating human population growth with a deer-population explosion seriously misleads teachers. The death of thousands of deer in the Kaibab National Forest in Arizona due to overpopulation taught an important lesson to wildlife biologists, but it teaches us very little about human population problems. Humans, economists argue, respond to economic incentives. When people are poor, they have many children out of economic necessity; children help to earn income and secure parents' old age. On the other hand, when people become more affluent, children are no longer seen as an economic asset and the birth rate declines. Therefore, economic pressures tend to cause people to have fewer children.[30]

The point is not that one view is correct and the other is wrong. The NAAEE *Guidelines* require that "a range of perspectives should be presented in a balanced way." Therefore, this one-sided editorializing mars what is otherwise an excellent book, helping teachers introduce children to the exciting world of nature.

To summarize, students in this course read two books that provide legitimate points of view. Unfortunately, students are not exposed to a variety of perspectives, as required by the NAAEE *Guidelines*. Thus, prospective teachers will come away from these materials with a biased and one-sided view of their teaching responsibilities. According to the *Guidelines*, teachers need to know that it is their responsibility to teach balanced and accurate environmental information, not a single viewpoint, as the only "correct" way of looking at the environment and environmental issues. Therefore, the materials used in this course do not meet the standards for fairness and accuracy required by the NAAEE *Guidelines*.

UW-LA CROSSE

At UW-La Crosse, preservice education students meet the Wisconsin environmental education requirement by taking the "Environmental Education Methods" (CI 381/581) course offered by the Department of Curriculum and Instruction.[31] Before students can take CI 381, they must take the prerequisite course "Conservation of Global Environments" offered by the Geography Department.[32]

GEO 200 Conservation of Global Environments

"Conservation of Global Environments" uses the William P. Cunningham and Barbara W. Saigo textbook, *Environmental Science: A Global Concern*.[33] The course syllabus indicates that it is a standard survey course that requires students to read and study the entire textbook.

The text *Environmental Science* is a comprehensive review that includes basic science and ecological principles, and coverage of environmental issues such as population growth, forests, air and water pollution, and energy. The authors set out to chart a middle course between those who argue the doom and gloom of catastrophic environmental degradation and those who argue that economic growth will provide the stability required for environmental

protection. This middle course seems to come not from an examination of the scientific evidence, but as part of a strategy to politically motivate students. The authors note that "guilt trips and predictions of disaster are so disempowering and disheartening that they become self-fulfilling prophecies. We hope this book will inspire its readers to become involved — individually and collectively — to work positively to protect and improve our global environment."[34]

The last chapter of the book makes it clear that the authors want students to engage in politics to achieve environmental ends. Chapter 25, "Toward a Sustainable Future," contains special sections on "Organizing an Environmental Campaign" and "Using the Media to Influence Public Opinion."[35]

This inclusion of political advocacy in an environmental science textbook is common to many of those reviewed for this study. It raises questions about the objectivity of the scientific information presented. In other words, is the scientific information selected to lead students to predetermined conclusions, so that they will be motivated to engage in particular environmental political causes, or is the scientific information presented in a balanced manner that allows students to decide for themselves? While there is nothing wrong with the latter, the former is a serious violation of the NAAEE *Guidelines* — which require materials to allow students to "explore different perspectives and form their own opinions."

The authors of this text state that their aim is to "achieve a balanced, realistic view of environmental conditions" and "to present relevant information and teach essential skills to allow students to analyze and discuss these challenging issues while forming their own opinions."[36] This is also the aim of the NAAEE *Guidelines* to which this book is compared.

This text's content, when compared to the NAAEE *Guidelines*, is quite uneven. Some chapters give fair and balanced coverage to alternative points of view. Others present only one side of important scientific debates.

For example, this text is one of the few to provide students with a population graph that plots population growth out to the year 2100. When this projection is made, students see that world population will level off during the next century. In addition, this chapter provides students with different theoretical perspectives — including that of neo-Malthusians, neo-Marxists, and the economic perspective represented by Julian Simon, a University of Maryland economist.[37] Simon argues that people are the "ultimate resource," because they use their creativity and knowledge to solve problems. Simon also notes that population increases are associated with important advancements for mankind — the discovery of fire and tools, the agricultural revolution, and the scientific-industrial revolution.

The chapter on resources provides excellent coverage of resource economics. Future teachers learn that the concept of non-renewable resources or exhaustible resources is too simplistic. Instead of resources being viewed as finite, students learn that, "[i]n practice, however, the available supplies of many commodities such as metals can be effectively expanded by more efficient use, recycling, substitution of one material for another, or better extraction from dilute or dispersed supplies."[38]

To illustrate this point, the authors relate the story of the famous wager between Paul Ehrlich, a noted Stanford University scientist, and economist Julian Simon. In 1980, they made a bet with each other on whether the prices of five metals — chrome, copper, nickel, tin, and tungsten — would increase or decrease, adjusted for inflation, over a 10-year period. Ehrlich believed that increasing demand due to growing world population and decreasing supply due to depletion of resources would lead to higher prices. Simon, on the other hand, argued that price signals cause people to adjust as described above. He has observed that prices have been steady or falling for most natural resources. In 1990, the prices had fallen 47%, and Ehrlich wrote Simon a check for $576.07.[39]

On the other hand, the chapters on species extinction and acid rain are not as balanced. The text reports very-high species extinction rates. These numbers, which are frequently reported in texts, are based on research conducted by scientists — among them, noted Harvard entomologist E. O. Wilson.[40] From this research conducted on islands, scientists have developed the theory of island biogeography. When these numbers are used, students

should also know that this theory and the numbers derived from it are disputed by other scientists working in this field. Professor Lawrence Slobodkin, writing in the journal *Nature*, notes that the theory is "useless for explaining or predicting actual cases."[41] The text does not mention this important scientific controversy to prospective teachers. This failure is surprising, because the authors are careful to mention the controversy over the rate of tropical-forest deforestation: "There is considerable debate about current rates of deforestation in the tropics."[42]

In addition, the coverage of the Endangered Species Act (ESA) is one-sided. The ESA is heralded as "a powerful new approach to wildlife protection." The text disparages the critics of this act by lumping them into either business interests or the Wise Use Movement.[43] The economic debate about the disincentives in this Act is ignored. To be balanced, texts must make students aware that the good intentions of the ESA are accompanied by unintended, sometimes negative, consequences — as is often the case with legislation. Many economists have observed that the ESA allows government agencies to restrict the use of private property by the owners. This creates powerful incentives for land owners in rural areas to destroy habitat before an endangered species is found on their private property.

In the chapter on air pollution, the authors discuss acid rain. The text notes that surveys in the early 1980s showed that mountain forests in Vermont and North Carolina showed serious diebacks due to acid rain.[44] What the authors of this 1995 text fail to mention is that a more recent study — in fact, the largest study of acid rain ever conducted — did not substantiate these early studies. The National Acid Precipitation Assessment Project (NAPAP) was conducted from 1980 to 1990, at a cost of $500 million. This study concluded that "[t]here is currently no widespread forest or crop damage in the United States related to [acid rain]" and "[s]ome areas may benefit through nutrient enrichment by nitrogen and sulfur deposition."[45]

More disturbing is the *possibility* that the authors knew about this research, but failed to relate its findings to future teachers. On page 386 of the text, the authors provide a map of the United States and Canada with acid-rain concentration levels indicated for various parts of the countries.[46] The sources for these data are the "National Atmospheric Deposition Program and the Canadian Network for Sampling of Precipitation." The National Atmospheric Deposition Program appears to refer to NAPAP. If the authors knew about the findings of NAPAP and failed to report them, they have done a serious disservice to the students reading their text.

In conclusion, this text has some of the more balanced chapters reviewed for this study, but the weaknesses of other chapters are serious and leave future teachers with one-sided information on some environmental topics that they are likely to convey to their students. Therefore, the information in this text is mixed and uneven, making the determination of whether it meets the NAAEE *Guidelines* inconclusive.

CI 381/581 Environmental Education Methods

In the School of Education, the Department of Curriculum and Instruction (CI) offers "Environmental Education Methods" for both undergraduate students (CI 381) and graduate students (CI 581) at UW-La Crosse. The syllabus outlines a methods course for learning how to teach environmental education. As such, it does not cover environmental issues, such as global warming, air pollution or recycling — but informs future educators about the methods they should use to teach about these issues. The prerequisite course "Conservation of Global Environments" provides the content.

One aspect of the syllabus for this course relates to the NAAEE *Guidelines*. The syllabus reads: "Controversial nature of Environmental Education teaching practices, resources and responsibility and ethical responsibility of the teacher to present all sides of issues, teach students how to think and not what to think."[47] While the exact meaning of this sentence is unclear, it seems to mean that due to the controversies that surround environmental education, teachers have an ethical responsibility to present all sides of environmental issues and to teach students how to think, not what to think. If this is the meaning, it is perfectly consistent with the NAAEE *Guidelines*. But as the review of the prerequisite-course textbook noted above, prospective teachers will be unable to teach "all sides of [environmental] issues," no matter how good the methods course, if they have not been taught them.

The syllabus indicates that the main text for this course is the Wisconsin Department of Public Instruction

(DPI)-published curriculum-planning guide, *A Guide to Curriculum Planning in Environmental Education*, by David C. Engleson and Dennis H. Yockers.[48] In addition, students are to read a packet of articles and to use reference books for environmental education activities.

The *Guide* quotes Ernest Martin Hopkins, whose sentiments are in full agreement with the NAAEE *Guidelines*. "Education's function is not to promote any propaganda, not to propound any principle as established and fixed for all time, not to assert that any belief is unchangeable, and not to assert that any conclusion may not be mistaken ...."[49] The *Guide* goes on to state that "education in ... a [free] society must provide students with opportunities to confront alternative points of view, to weigh them rationally, to determine their own positions on issues ... educators must be careful to educate rather than indoctrinate."[50]

Yet in other places, the *Guide* seems to contradict itself. Two essential parts of environmental education as presented in this *Guide* are to have students acquire "positive environmental behavior" and to "teach citizen action skills."

To accomplish "positive environmental behavior," behavioral models and behavior modification techniques are discussed in Chapter Four, "Theoretical Base," and implemented in later sections.[51] For example, in a section dealing with teaching EE in the primary grades, future teachers are told how to implement these techniques. During a field trip to a natural area, it is suggested that "the teacher might ask questions like: 'If you were a dandelion or a rabbit, would you like to live here? Why or why not? How would you feel if someone would damage or destroy this area? Would you like others to be able to enjoy this area?'"[52]

While teaching children to enjoy and appreciate nature is an important part of environmental education, this exercise is a deliberate manipulation of emotions to achieve "environmental sensitivity." Use of this technique in the early grades is likely to produce students predisposed to reject a more intellectual approach in later grades — when economic trade-offs, housing prices and needs, or other factors that may bear on open spaces are discussed. Students are not likely to be open to the range of perspectives recommended in the NAAEE *Guidelines* if they have been encouraged at an early age to substitute feelings for thought.

The "citizen action skills" that prospective teachers are expected to teach their students are also problematic. Some of these "skills" include teaching how to write letters to the editors of newspapers and to elected officials, how to boycott products, and how to raise money for environmental organizations. The *Guide* is careful to note grade-level appropriate activities. It states that "[a]lmost any type of action available to citizens is appropriate involvement for high school students."[53]

There is nothing wrong with teaching about political action in a neutral atmosphere, in which students are not led to predetermined political actions. Unfortunately, as this report documents, many environmental education materials do not measure up to this standard. Students must be allowed to "form their own opinions" before they engage in political activity.

For example, it is very difficult for prospective teachers who have incomplete or biased information to stay within the parameters of the NAAEE *Guidelines*. The discussion of the ESA in the Cunningham and Saigo text used in the prerequisite course does not include economic criticisms of the ESA. It would be difficult for a teacher trained with that text to ensure that students are considering all points of view and forming their own opinions. Students are likely to become politically active only in support of the current provisions of the ESA, because they are unaware of alternatives. Students are also likely to engage in one-sided political action, given the biased coverage of the acid-rain issue in the text.

In conclusion, the two-course sequence that is required at UW-La Crosse has both strengths and weaknesses. Future teachers will benefit from excellent coverage of some environmental issues and they will learn that they must responsibly educate children to learn how to think, not what to think. On the other hand, future teachers will be misled by one-sided coverage of other environmental issues. They will be encouraged to engage in "environmentally correct" behavior modification and to encourage children to become active in environmental political ac-

tivities without a balanced understanding of many environmental issues. Since both of these courses are required to meet the certification requirement, both sets of course materials must be considered as a package. The information in the materials is uneven. Therefore, the comparison of this information to the NAAEE *Guidelines* is inconclusive.

UW-MADISON

At UW-Madison, two courses were selected from a list of 22 that meet the Wisconsin EE requirement. "Environmental Economics" and "Global Physical Environment" were selected based on the advice of an education certification specialist who helps students meet their certification requirements. She stated that these courses are among the most popular selected by students to meet the EE requirement.[54] In addition, the economics course provides the only example at the eight campuses in this study of an economics course that meets the EE requirement.

ECON 343 Environmental Economics
Cross-listed in the Environmental Studies Department as ES 343 and
the Agriculture and Applied Economics Department as AAE 343

The syllabus indicates that this is a survey course that provides students with an overview of "economic thinking on environmental issues."[55] Students must have a course in microeconomics (or instructor approval) before they can take this course. The professor indicates that students will be introduced to "the insights that economics can provide" and "the pitfalls of economic approaches."[56] The course reading list requires students to read nearly all of the 21 chapters in the introductory text assigned.

The text for this course, *Environmental Economics: An Introduction*, by Barry C. Field, provides students with an overview of economic principles and concepts and then applies these to current environmental issues.[57] The text covers such issues and concepts as pollution, resources, global warming, biodiversity, and sustainability. Concepts related to public-policy issues are also covered. It is the only text reviewed for this study that uses academic citations for the sources of information in the text. Other textbook authors should follow this author's lead.

This text treats major environmental controversies in a relatively balanced manner. For example, after covering the possible effects of global warming, the author also includes the uncertainties associated with global warming computer models and theory.

> The discussion in the last few paragraphs may represent widespread thinking among scientists, but it has to be recognized that the predictions about global warming remain uncertain. The results come from highly complex models of the earth's atmosphere, which require enormous amounts of meteorological and socio-economic data and incorporate large numbers of interrelationships and feedbacks. Small changes in the models can greatly change the conclusions .... Other person-made factors can intervene; for example, it now appears SO2 in the lower atmosphere reflects sunlight, thus working against the greenhouse phenomenon. The same may be true of CFCs in the upper atmosphere. Small wonder, then, that there are still differences among scientists about the seriousness of the problem.[58]

Thus stated, the text goes on to assume global warming will occur and examines the economics of public-policy recommendations needed to reduce greenhouse gases. Some would argue that a more substantial discussion of the scientific controversy is necessary to be balanced, but that is not necessarily the goal of an economics text.

A similar approach is applied to recycling,[59] biodiversity,[60] and economic approaches to water and air pollution.[61]

In addition, this text covers basic economic concepts — such as efficiency, property rights, command-and-control solutions, and ramifications of governmental enactments. These basic concepts should be introduced to all prospective teachers who will teach environmental education.

For example, unlike many texts which uncritically accept government command-and-control environmental solutions, this text includes both the strengths and weaknesses of this approach and the trade-offs it requires.

> There is a natural tendency among people to think that enacting a law automatically leads to the rectification of the problem to which it is addressed. Among the environmental community this tendency is depressingly strong .... A moment's reflection should convince us that this isn't so, even in countries that have relatively strong legal traditions and institutions. **Enforcement** requires energy and resources, just like any other activity, and there will always be other calls on these resources.[62] (emphasis in original)

Another example is the text's coverage of the role of property rights in preserving the environment. "The problem of the misuse of many environmental assets comes about because of imperfectly specified property rights in those assets."[63] A thoughtful exposition of the controversial private-property "takings" issue — government regulation of private property to protect habitat that has the effect of prohibiting the owners use or benefit — presenting different perspectives also distinguishes this text from others. Environmental preservation issues that affect the value of privately held land, possible solutions, including compensation alternatives, are discussed in an even-handed manner.

On the whole, this text strives to provide balanced coverage of environmental issues based on the rigor of economic thinking. While this is a strength, it is also a limiting factor. Since the text is designed to teach economics, it is limited in its coverage of the science of environmental issues. Thus, the need for prospective teachers to receive a good grounding in both science and economics is not satisfied. Therefore, this text meets the NAAEE *Guidelines*, but only with this important qualification.

GEOG 120 Global Physical Environments

The College of Letters and Sciences, Department of Geography, offers "Global Physical Environments" and its syllabus describes a demanding science course.[64] The assigned text, *Physical Geography: A Landscape Appreciation*, by Tom L. McKnight, is a basic, college-level introduction to physical geography.[65] The environmental education coverage in the book is primarily in special inserts, typically two pages in length, called "People and the Environment." The text contains 16 of these inserts, highlighting environmental issues such as rainforest destruction, global warming, acid rain, and ozone depletion.

For example, the insert entitled "Rain Forest Removal" cites the following rates of deforestation.

> The rate of deforestation is spectacular — some 51 acres (21 hectares) per minute; 74,000 acres (30,000 hectares) per day; 27 million (11 million hectares) per year. More than half of the original African rainforest is now gone, about 45 percent of Asia's rainforest no longer exists, and the proportion in Latin America is approaching 49 percent.[66]

In addition to the lack of a citation for the source of these figures, this passage and the entire section are misleading because the author fails to distinguish between tropical forests and rainforests. These numbers are most likely for tropical forests — which are composed of six vegetation types, one of which is rainforests. But this section is surrounded by a discussion of rainforests, so the reader is left with the impression that these numbers are for rainforests. While all tropical-deforestation numbers are uncertain, many experts regard the United Nations' Food and Agriculture Organization (FAO) numbers as the most authoritative. FAO estimates that rainforest deforestation is closer to 21 acres per minute than the 51 acres per minute cited above.

To its credit, the insert does discuss the fact that tropical forests naturally regenerate, but it fails to mention the development and expansion of tree plantations in the tropics. In fact, in the area that the text notes the highest rate of deforestation occurring, southern and southeastern Asia, tree plantations are expanding rapidly with roughly 10% of the deforested area replanted in tree plantations.[67]

Another environmental topic covered by this text is acid rain. In a two-page insert, the author uses well-qualified sentences to proclaim that acid rain "is known to be a major hazard to the environment" and that "it is the major culprit in forest diebacks currently taking place on every continent except Antarctica."[68] This discussion of acid rain also fails to mention the NAPAP results. NAPAP issued a preliminary report in 1987 and a final report in 1990. This 1996 text fails to mention the report's findings — that little or no evidence can be found that acid rain is harming forests and that on the whole, acid rain is not a major hazard to the environment.[69]

These two examples illustrate that, at least as far as these environmental sections of this text are concerned, the information is one-sided and misleading. This text does not meet the NAAEE requirement for fair and accurate information.

UW-MILWAUKEE

At UW-Milwaukee, one course meets the state EE requirement. This course, "Environmental Education for Teachers," is taught in the School of Education's Department of Curriculum and Instruction.[70]

CURR INS 326 Environmental Education for Teachers

The syllabus for this course indicates that it is both an overview of basic environmental science and an EE teaching methods course. The course objectives include the following: "To update knowledge of human, technological and environmental interactions," "To outline effective teaching methodologies," and "To provide skills and knowledge to develop unit and lesson plans for environmental education at all levels of elementary education."[71]

The only text assigned for this course is G. Tyler Miller's *Sustaining the Earth: An Integrated Approach*.[72] A reiteration of the NAAEE *Guidelines* is helpful here. Of particular relevance are the sections requiring: 1.) that a "range of perspectives should be presented in a *balanced way*;" and, 2.) the "treating [of] major positions *fairly*" (emphasis added). This Miller text does cover a range of scientific and economic positions on many environmental issues, but whether these treatments are balanced and fair is another story.

The Miller text — one of many the author has published — does not have environmental science in the title, but it is clear from the preface that he intends it to be a slimmed-down version of his longer, more comprehensive, environmental science texts. Miller also indicates his approach to environmental science education. He relates the story of how he first became involved in studying the environment after he heard a 1966 lecture on "the problems of overpopulation and environmental abuse."[73] After six unsuccessful months trying to prove the statements untrue or grossly distorted, he accepted them and began his career "studying, teaching and writing about them."[74] It seems that he starts his consideration of any environmental issue from a predisposition that overpopulation is a problem that causes environmental abuse. This is not the open-minded view required for a balanced and fair study of environmental science.

Miller's definition of education is also unusual. He states that he agrees with Norman Cousin's statement that "[t]he first aim of education should not be to prepare young people for careers, but to enable them to develop a respect for life."[75] A noble goal, but the NAAEE *Guidelines* argue that the first goal of EE is the presentation of theories and facts in a balanced and fair manner.

The preface also indicates an unusual feature for a university-level textbook. Although he indicates that he has consulted "more than 10,000 research sources in the professional literature," he fails to cite any of these sources in the body of the text.[76] Because of this, it is impossible to trace the sources of the statements and data presented.

The first section of Chapter 1 provides the reader with the theme of the text: "*The environmental problems we face — population growth, wasteful use of resources, destruction and degradation of wildlife habitats, extinction of plants and animals, the widening income gap between the rich and the poor, and pollution — are interconnected and are growing exponentially*"[77] (emphasis in the original). While there are significant problems in these areas, Miller's claim that they are growing exponentially is impossible to prove scientifically. In fact, even the casual observer will note that by most measures, air pollution in the United States is not growing exponentially, but actually declining. While we continue to have habitat problems in the U.S., certain species are increasing (deer, antelope, wild turkey, *etc.*), and our forest inventory continues to expand, despite increasing timber harvests.[78]

Miller's larger point is that world-population growth causes increases pressures on the environment. He goes out of his way to convince the reader that world population is growing exponentially by following the emphasized statement above with: "For example, world population has more than doubled in only 44 years, from 2.5 bil-

lion in 1950 to 5.6 billion in 1994."[79] But other data provided and the graph in his own Figure 1.1 indicate a more complete picture.[80] Figure 1.1 correctly indicates that world population is expected to level out during the next century. Miller provides three estimates for the total world population in the year 2100: 7, 10, and 14 billion people. While many demographers would argue that the 14-billion figure is too high, the graph demonstrates that world population will not continue to increase exponentially and in fact, using Miller's own numbers, it is questionable whether world population will double again.

This example provides a pattern that confronts the reader throughout the text. On one hand, Miller presents facts, figures, and theories from a range of perspectives. On the other hand, he presents this information in a selective way, fails to provide citations, and uses rhetoric that leads students to Miller's predetermined conclusions.

Three brief examples will illustrate this point. *First*, in the 21-one page chapter on human population growth, Miller provides only two paragraphs on the view that the world is not overpopulated. Miller refers without citations to the work of leading economists represented by Julian Simon.[81] Simon argues that the physical limits of the earth's resources is not the proper focus. Instead, we should view people as the "ultimate resource," because it is people who have the creativity and ingenuity to use resources in different ways. After all, Simon would argue, we save tons of copper wire today because we use fiber optics made of sand, and satellites for much of our communications. Citations to the work of Julian Simon and others are not provided, so interested readers will not be able to follow up with further reading. Miller's coverage of these views is hardly balanced or fair.

Second, in the section on acid rain, Miller reduces the findings of the NAPAP study to: "A large-scale, government-sponsored research study on acid deposition in the United States in the 1980s concluded that the problem was serious but not yet at a crisis stage."[82] Contrary to Miller's characterization, the NAPAP study concluded that in many areas — forests and crops, for example — acid rain was not a serious problem. The report states that "[t]here is currently no widespread forest or crop damage in the United State related to [acid rain] .... Some areas may benefit through nutrient enrichment by nitrogen and sulfur deposition."[83]

Miller's very next sentence describes the position of coal companies and industries on the expense of adding air-pollution-control equipment to their production processes. This same paragraph also contains the results of a 1990 study that estimated that controlling acid rain would produce economic benefits in the range of $5 billion to $10 billion. These "hit-and-run" techniques leave the reader with the impression that, except for a government study and the coal companies, there is consensus on the problems of acid rain and their solutions. Again, no citations are provided for any of this information.

A *third* example occurs in the nine-page section on global warming. This section covers many of the scientific uncertainties and qualifications related to global warming. In a four-paragraph section, Miller outlines the three schools of thought on global warming: global warming is not a threat, we should wait for more research, and we should take action now. While the three positions are correctly stated, they are too brief for readers to decide which is appropriate. More important, significant findings of the scientists in the first two groups are not included in the nine pages of this section. For example, satellite-temperature records of the Earth since 1979 show no warming. Most of the warming during the last 100 years occurred before 1938, while most of the carbon dioxide increase has taken place after 1938. In addition, the graph in his Figure 9-8 indicates that warming since 1850 was recorded by surface-temperature measurements, but these measurements have been questioned for several reasons — among them, the "heat-island" effect that surrounds large cities, in which many weather stations record temperatures.[84]

The lack of citations in this text provides a curious paradox. Miller begins the text with the story of how he conducted six months of research to disprove the statements about environmental abuse and overpopulation. When he failed to disprove the statements, he began his writing and teaching on environmental problems. Yet, now that he is a teacher, he does not encourage his students to embark on a similar inquiry, but instead leads them to predetermined evaluations and conclusions concerning the environmental issues we face. If a student reading his text has the same mental reservations that Miller had in 1966, he or she will not have the citations needed to facilitate an investigation of Miller's assertions. All in all, this text lacks the balance and fairness of presentation required by the NAAEE *Guidelines* to prepare prospective teachers to teach environmental education. Therefore, this text does not meet the NAAEE *Guidelines*.

UW-STEVENS POINT

At UW-Stevens Point, the College of Natural Resources offers the course "Introduction to Environmental Study" (NRES 370 for undergraduates, NRES 570 for graduates) to fulfill the EE requirement for preservice teachers.[85]

NRES 370/570 Introduction to Environmental Study

The course syllabus indicates that students attend two lecture sessions and one discussion session per week. Discussion sections are organized according to teacher certification area (such as elementary and middle school teachers, and secondary science and social studies teachers).

The primary text for this course is *Environmental Science: Working With the Earth*, by G. Tyler Miller.[86] This text is an expanded version of the Miller text *Sustaining the Earth* used in the EE course offered at UW-Milwaukee. Because many of the sections in this text are nearly identical to *Sustaining the Earth*, this text has many of the same problems discussed above. The thesis of the text is the same, the text lacks citations, and the discussion of human population growth, acid rain, and global warming all suffer from the same flaws noted above. In addition to these problems, there are other problems of bias and misrepresentation.

This Miller text was one of the texts reviewed by the recent report of the Independent Commission on Environmental Education. This commission was composed of 10 prominent scientists and economists. It reviewed popular EE materials, including textbooks, used in American schools. The Commission report states:

> The [Miller] textbook begins with a discussion of the "crisis of unsustainability" faced by the earth and calls for an "Earth-wisdom worldview." To define "Earth-wisdom," the text quotes David Foreman, founder of EarthFirst!, "When a chain saw slices into the heartwood of a two-thousand year-old Coast Redwood, it's slicing into my guts ... Madmen and madwomen are wrecking this beautiful, blue-green, living Earth" (p. 36 [of the Miller text]).
>
> This introduction sets the tone for the remainder of the text. Throughout, the author cites the published literature selectively and without proper references in order to justify his personal recommendations. Although entitled an "environmental science" text, the author [Miller] announces his intention to "provide a readable and accurate introduction to environmental science *without the use of mathematics or complex scientific information*"[emphasis added] (p. v). Indeed, the author misses every opportunity to reinforce, apply, and motivate the study of science.[87]

In addition, the Commission report notes that the California-based newsletter *The Textbook Letter*, founded by several scientists and journalists to review science textbooks, reported in its review of this Miller text: "The [Miller] book is so insistent in promoting its world-view that it could serve as a model for education-with-indoctrination."[88]

One of the special features of this text is the inclusion of 16 guest essays. These sections "present an individual researcher's or activist's point of view, which are then evaluated by two critical thinking questions."[89] All but one are written by individuals who largely support Miller's point of view. The one exception is the essay by Julian Simon, and his views do not stand unchallenged. Immediately following Simon's essay is a critical essay by Paul and Anne Ehrlich. This point-counterpoint technique, popular in some textbooks, is the only one used in the text. The other 14 essays stand alone without a noted authority commenting. It appears that Miller will not allow Simon's views, which are heretical to most environmentalists, to stand unchallenged.

Miller also telegraphs his bias in one of the so-called "Critical Thinking" questions that follow Simon's essay.

> 1. Do you agree with the author's [Simon's] contention that there is no environmental, population, or resource crisis? Explain. How is it compatible with the data presented in Figure 1-12? [The figure is a world map with locations indicated for environmental degradation, vanishing biodiversity, endangered species, and

overpopulation.] *Try to remember to answer this question again to see if your views have changed after you've finished this text.*[90] (emphasis added)

The "Critical Thinking" questions that follow EPA Administrator Carol Browner's essay also fail to engage students in real critical thinking. After an essay that documents environmental horror stories and strongly supports increased government regulation to solve them, students are asked: "2. Do you believe that the federal government should cut back on environmental regulation? Explain. If so, what specific environmental regulation do you believe have gone too far?"[91] This essay appears near the end of a section on "Politics and Environmental Policy." This section contains scant criticism of any government policy and critics are indiscriminately lumped into a well financed, "anti-environmental movement." It is difficult to conceive of any student answering the Critical Thinking question in the affirmative.

UW-Stevens Point is nationally known as the home of the National Environmental Education Advancement Project, which assists state and local officials and groups to foster comprehensive EE programs in the states. It is especially disappointing that this Miller text, which has been called "a model for education-with-indoctrination," is used at Stevens Point to prepare future EE teachers for their educational responsibilities. This text does not meet the high standards for fairness and accuracy set by the NAAEE *Guidelines*.

UW-SUPERIOR

At UW-Superior two courses meet the DPI EE requirement. They are "Environmental Science" (BIOL 100 and 101), which includes a laboratory requirement, and "Concepts in Biology" (BIOL 123).[92]

BIOL 100 (lecture) **Environmental Science**
BIOL 101 (lab)

The "Environmental Science" lecture and lab together meet the teaching-certification requirement for prospective teachers. The required text is *Environmental Science: The Way the World Works*, by Bernard J. Nebel and Richard T. Wright.[93]

The preface to this text opens by contrasting the optimistic view of global prosperity, based on expanding world markets, and the pessimistic view of environmental degradation. The authors state that the "former [optimistic] camp may underappreciate the overwhelming reality of environmental issues. However, the latter [pessimistic] camp may underappreciate the potential of the human species to shape its own destiny with intelligence, foresight, and compassion. *Environmental Science: The Way the World Works* gives full credence to both."[94]

This seemingly objective beginning to an environmental science textbook is short-lived. On the same page, the authors state the theme of the text: "The objective of creating a sustainable base on which human civilization can continue to develop technologically and socially becomes the theme of the text."[95]

The first chapter expands on this theme by defining "sustainable," "sustainable development," and "sustainable yields." The text defines sustainable society as "a society that continues, generation after generation, neither depleting its resource base by exceeding sustainable yields nor producing pollutants in excess of nature's capacity to absorb them."[96]

This seemingly common-sense, noncontroversial idea is uncritically accepted by the authors. Future teachers reading the text are expected to adopt and promote the concept of sustainability. The authors are so wedded to this concept that criticism of the concept is unacceptable. In a section entitled "Thinking Environmentally," which follows Chapter 1, the authors want to test whether their arguments for sustainability have taken: "Some people say that the concept of sustainable development is an oxymoron or represents going back to some kind of primitive living. Present an argument demonstrating that neither is the case, but that sustainable development is the *only course that will allow the continued advancement of civilization*"[97] (emphasis added).

In other words, if the reader rejects sustainability and accepts another concept, he or she is contributing to

the downfall of civilization. This is hardly the open-minded approach required by the NAAEE *Guidelines* for fairness and accuracy.

In fact, nowhere in the text is the concept of sustainability subjected to academic rigor by reviewing the historical record, related economic concepts, or political implications. Students are expected to accept this concept by blind faith. For example, during the 1800s, the American historical experience reveals a period of unsustainable forestry practices that helped fuel rapid economic development. However, the United States now grows more wood than it cuts.[98] Some observers argue that unsustainable practices in the developing world are following the same pattern, and that as these countries prosper, they will shift to sustainable practices.

Some economists argue that a huge amount of scientific and technical information will be needed to make sustainable-resource-allocation decisions. They question the ability of government agencies to gather and process this information outside the normal market decisionmaking processes. They point to the failure of Soviet centralized planning (and its dreadful environmental consequences) and predict similar results if resource decisions are made by government bureaucracies using the concept of sustainability.[99]

Finally, there are serious political implications that flow from the concept. The dependence on government bureaucracies that have a near monopoly on expert information automatically gives them enormous power. Bureaucratic and administrative power based on specialized information is well-recognized in political science literature. Nearly a century ago, Max Weber, the famous bureaucratic theorist, noted that a "bureaucracy, out of a sure power instinct, fights every attempt of the parliament to gain knowledge by means of its own experts or from interest groups .... [B]ureaucracy naturally welcomes a poorly informed and hence a powerless parliament."[100]

Weber's comment is echoed by a more recent observer of bureaucratic power, who uses the following syllogism: "Administration is knowledge. Knowledge is power. Administration is power."[101] Some academics argue that administrative power gained from expert knowledge challenges or even threatens democratic decisionmaking.[102] The authors fail to inform students of these or other criticisms of this important concept.

Furthermore, alternatives to sustainability must be presented in a balanced environmental education curriculum. This is not only demanded by the NAAEE *Guidelines*, but it is required by the advanced placement (AP) environmental science curriculum for high school students. The College Board, which publishes the AP course descriptions, specifically wants students to learn three other concepts in addition to sustainability. These are conservation, preservation, and remediation.[103] It is ironic that the expectations for AP high school students are higher than those established by Nebel and Wright for college students.

After carrying this theme throughout the book, the authors use the "Epilogue" as a call to arms. Future teachers are asked to consider the forces aligned against the policies that will produce a sustainable future. "Still, the forces aligned with the traditional directions (while nonsustainable) are formidable. Thus the outcome is still unsure."[104] Students are urged to respond to this threat in four ways. They are asked to: 1.) adopt certain "environmentally correct " lifestyle changes; 2.) engage in political activity in favor of specific environmental causes; 3.) join environmental organizations, such as the Environmental Defense Fund; and, 4.) consider an environmental career.[105] In advocating these responses by students, the authors have not met the NAAEE *Guidelines* by allowing students to "explore different perspectives and form their own opinions."

This text does not educate. It selects information that supports the authors' world view and then exhorts students to accept and act on that view. The authors appear to subscribe to the doctrine of "the end justifies the means." According to that doctrine, realizing the end of an improved environment justifies indoctrinating students. The NAAEE *Guidelines* require that a fair and balanced education should be the goal. This text does not meet the fairness and accuracy requirements of the NAAEE *Guidelines*.

BIOL 123 Concepts in Biology

At Superior, "Concepts in Biology" also meets the state requirement for environmental education.[106]

There are two texts required for this course. The first is G. Tyler Miller's *Environment: Problems and Solutions*.[107] The second text is by Gerald and Teresa Audesirk, *Biology: Life on Earth*.[108]

The syllabus indicates that this course is roughly three-quarters a biology course that uses the Audesirk and Audesirk biology text as the primary resource. The final one-quarter of the course uses four chapters of the Miller environmental text.

The coverage of biology in the Audesirk and Audesirk text (11 of the 46 chapters) is a standard survey of biology. The chapters selected for student reading in this course include chemistry of life, photosynthesis, evolution, circulation, respiration, and the urinary system. While some of the chapters in this text touch on environmental issues, none of those assigned for this course do so. The assigned chapters concentrate on coverage of essential biological science concepts, not coverage of environmental issues. Prospective teachers will receive a good education in biology from these chapters.

The Miller text, *Environment: Problems and Solutions*, is a much-abbreviated version of Miller's larger environmental science text. Students in this course read four of the seven chapters in this text. Topics covered include human population growth, global warming, ozone depletion, and water pollution. As noted before, this text has been criticized by the Independent Commission on Environmental Education and a science textbook newsletter, *The Textbook Letter*, called it "a model for education-with-indoctrination."[109]

The Audesirk and Audesirk *Biology* text provides students with a good background in biological science. The Miller text, on the other hand, suffers from the bias discussed above in the sections covering materials used at Milwaukee and Stevens Point. Therefore, its inclusion in this course leaves prospective teachers misinformed. The biased information found in the Miller text does not meet the NAAEE *Guidelines* for fairness and accuracy.

UW-WHITEWATER

At UW-Whitewater, students may select one of two courses that meet the EE requirement. "Ecology and Society" is a course offered in the biology department. The other course, "Human Environmental Problems," is a course offered in the geography department.[110]

BIOL 214 Ecology and Society

"Ecology and Society" is offered by the Department of Biology in the College of Letters and Sciences. According to the syllabus for this course, it is "designed to develop understanding of the interrelationships of humans and their environments."[111] This course uses the same G. Tyler Miller text, *Environmental Science: Working with the Earth*, that is used at UW-Stevens Point. As the review of this text that appears above in the section on UW-Stevens Point concludes: "It is especially disappointing that this Miller text, which has been called 'a model for education-with-indoctrination,' is used at Stevens Point [and Whitewater] to prepare future EE teachers for their educational responsibilities. This text does not meet the high standards for fairness and accuracy set by the NAAEE *Guidelines*."

GEOG 252 Human Environmental Problems

According to the syllabus, this course "is an introductory course on environmental problems created by the human race, and it is structured primarily for those with only a very cursory background in environmental issues."[112] The syllabus sets an open-minded tone that echoes the NAAEE *Guidelines* by noting:

> There are no absolute solutions to environmental problems since the environment is a dynamic system and our impacts upon it are constantly changing. Present members of the human race can only offer alternate solutions for dealing with impacts on the environment, and each alternative brings with it some kind of environmental trade-off![113]

The course uses as its primary text *Biosphere 2000: Protecting Our Global Environment*, by Donald G. Kaufman and Cecilia M. Franz.[114] In addition, the instructor assigns readings from the book *Environment 1994/1995*, which is part of the Annual Editions series published by Dushkin Publishers, and readings placed on reserve by the instructor in the library.[115] A large majority of the library reserve readings is from *National Geographic* magazine, with other articles from *Audubon*, *Smithsonian*, and *National Wildlife*. These readings provide alternative points of view and balance to opinions found in the primary textbook. For example, the *Smithsonian* article, "Five Major Myths About Landfills, And Why They Are Wrong," by William Rathje and Cullen Murphy offers information about landfills not often found in textbooks.[116]

The course instructor has selected portions of 21 of the 28 chapters of the *Biosphere 2000* textbook for students to read. The following review covers only those sections of the text that students are required to read.

The preface to this text begins with a quote from Aldo Leopold. It is clear from this and other quotes from Leopold that the authors place environmental science in the context of his philosophy and ethics. In fact, the fourth theme of the text is that "all human societies must develop a stewardship or land ethic of resource use."[117] An uncritical acceptance of this "ethic" through the concept of sustainability is one of the primary characteristics of this text. The other three themes are: 1.) hope ("despite the scope and gravity of environmental problems, we find reason to hope"); 2.) "an interdisciplinary problem-solving model;" and, 3.) an argument that "many problems can be avoided altogether through environmentally sound resource management."[118]

As the reader will notice, concentrating on a balanced and objective presentation of the science behind environmental issues is not included in these themes. In fact, these four themes taken together have more to do with developing and proselytizing a new world view than using the academic disciplines of science and economics to teach about the environment. In Chapter 26, "Economics and Politics," economic principles and concepts are selectively presented to reinforce only those views of the authors that conform to the themes.

The authors are not timid about their explicit attack on Western civilization and culture: "The dominant Western worldview, with its emphasis on the exploitation of nature and resources, the accumulation of wealth, faith in science and technology, and belief in the inherent rights of the individual, was a powerful and aggressive force."[119] They go on to explain how the environmental crisis we face today is largely a result of key elements of Western civilization: Christianity, science, industrialization, and, in America, the frontier mentality. According to the authors, the solution to the environmental problems left by this aggressive worldview is to establish a new ethic based on the environmental revolution that emphasizes sustainability. As with other texts reviewed for this report, sustainability is accepted uncritically as a new dogma. Relevant academic criticisms of this concept from history, economics, and political science are not included.[120]

The point is not that Western civilization should be above criticism. Students should be taught to question and criticize. The point is that this text presents Western civilization as an unmitigated evil responsible for environmental crises and that a new world view of environmentalism based on sustainability is the only solution. This is biased advocacy that has no place in an environmental science text. Students are not presented with balanced and objective information that allows them to form their own opinions.

It appears that the instructor for this course recognizes the bias of this text and has assigned readings that provide students with alternative views. For example, the instructor has assigned the article "The Mirage of Sustainable Development."[121] As stated before, the syllabus indicates the intent to be more balanced and open-minded. "There are no absolute solutions to environmental problems .... [We] can only offer alternate solutions for dealing with impacts on the environment, and each alternative brings with it some kind of environmental trade-offs!"[122]

The course materials used in this course are mixed. While the primary textbook is overtly biased and one-sided, the readings, on the other hand, offer some balance. Therefore, this evaluation based on the NAAEE *Guidelines* is inconclusive. Given the materials reviewed, it is not possible to state with certainty whether prospective teachers will receive a fair and accurate environmental education from these materials.

FINDINGS

Most of the materials reviewed for this study do not meet the NAAEE *Guidelines* for fairness and accuracy. Many of the materials used to train prospective teachers provide a strong dose of advocacy in the guise of environmental science, both as to lifestyle changes and political action. The science in many of these materials is selective. Authors use those scientific findings that support their larger world view. Economics is largely missing. In the few cases where the economics of environmental issues is presented, it is in the context of a particular brand of environmentalist ideology. Finally, these materials largely fail to convey the important educational responsibility of teachers to educate and not indoctrinate. What is worse, some of these materials set a bad example for future teachers by engaging in open advocacy in support of an ideological world view.

1. Many materials mislead prospective teachers by mixing science with advocacy.

The NAAEE *Guidelines* require that EE materials must conform to the principle of "openness to inquiry." This means that "[m]aterials should encourage learners to explore different perspectives and form their own opinions."[123] Unfortunately, many materials fail to meet this guideline, because they mix science with advocacy. The Miller texts, the Nebel and Wright text, and the Kaufman and Franz text are especially guilty of this practice. The authors seem to be more interested in promoting their solutions for "saving the planet" than educating students. For example, all of these texts uncritically evangelize for the concept of sustainability without informing future teachers of criticisms from various academic disciplines. Furthermore, these texts advocate specific lifestyle changes and political actions based on the concept of sustainability. Given the biased coverage of environmental issues, learners are not permitted "to explore different perspectives and form their own opinions."

This advocacy is often justified with the statement that environmental education encompasses the social sciences. There is nothing wrong with including social science in environmental science, but this inclusion does not negate the responsibility to conform to the NAAEE *Guidelines* by providing a "balanced presentation of differing viewpoints and theories."[124] Differing viewpoints and theories compete in the social sciences as well as in the natural sciences. In other words, a lesson on recycling and solid waste should include economic trade-offs on the comparison of costs of recycling, landfill, and incineration. Human-population discussions must include balanced and fair treatment of both the neo-Malthusian theory and a critical application of economic reasoning. Additionally, when students are taught about the Endangered Species Act, they must be presented with ideas from political science that include both the intended and unintended consequences of this Act.

2. The science presented as environmental science in many of these materials is often the selective use of scientific information to lead future teachers to predetermined conclusions.

The NAAEE *Guidelines* require that materials must be balanced and accurate. According to the *Guidelines*, "Scientifically and socially credible positions and explanations are covered *thoroughly*, while other positions are also *mentioned*. (Balanced presentation does not mean giving equal time and space to every opinion or perspective, but treating major positions *fairly*)"[125] (emphasis added). Thus, the *Guidelines* rule out the selective use of scientific information to "prove" a predetermined conclusion.

This review of materials has demonstrated that many EE materials use scientific information selectively. The coverage of acid rain, for example, usually fails to mention the findings of the largest study of acid rain ever conducted. The 10-year, $500 million NAPAP study found that acid rain was much less severe than previously thought. These findings are selectively missing from most materials reviewed. The question arises: if the NAPAP findings had shown that acid rain was worse than previously thought, would they then be included in these texts?

Coverage of the global warming issue often fails to include a detailed discussion of the scientific tools used to make warming predictions. Scientists use computer modeling to simulate and predict weather and climate conditions. This legitimate scientific tool is used in many scientific areas, and it is essential for prospective teachers to know that these models are the basis for warming predictions. Teachers must know both the strengths and weaknesses of this scientific tool if they are to do a complete job of transmitting global warming information to their students. This scientific discussion is often missing. Instead, prospective teachers are given the results and predictions

derived from this tool, which are that the atmosphere is and will continue to warm with catastrophic results. Prospective teachers do not receive the knowledge they need to evaluate critically the science behind these predictions.

In addition, coverage of the science used by the critics of global warming theory is largely missing from these materials. When it is included, it is often presented unfairly. Yet, these scientists represent a significant position in the scientific community. They point to actual data, such as the temperature record measured by satellites that shows no warming trend since 1979. The NAAEE *Guidelines* require that a "range of perspectives should be presented in a balanced way" and that "balanced" means "treating major positions fairly." Thus, the findings of these scientists must be included in order for an EE material to meet the NAAEE *Guidelines*.

Finally, basic scientific information is selectively missing from or confused in these materials. For example, in the discussions of rainforests, the basic distinction between tropical forests and rainforests is not adequately explained. Tropical forests are composed of six vegetation types, with rainforests being one of those types. Figures for rainforest destruction are often misleading, because the author is using data for tropical forests.

3. Even though these materials claim to be multidisciplinary, with the inclusion of economics, a balanced and fair treatment of economic reasoning is largely nonexistent in them.

The NAAEE *Guidelines* for fairness and accuracy clearly indicate that scientific discussions include the social sciences, which include economics. According to the *Guidelines*, "Scientific and socially credible positions and explanations are covered thoroughly." This review of EE materials used to train teachers indicates that, with rare exception, this guideline is being violated. The exceptions are the text *Environmental Economics* and Chapter 8, "Environmental Resource Economics," in the Cunningham and Saigo text. The application of economic reasoning to the coverage of endangered species, human population growth, and natural resources is either inadequate or missing.

For example, Chapter 26, "Economics and Politics," in the Kaufman and Franz text does not provide students with an overview of how basic economic principles are applied to environmental problems or issues. Instead it selectively uses the idea of incentives to achieve predetermined environmental goals. That is, this chapter discusses such tax incentives and regulatory policies as green taxes on gasoline to cut consumption, tax credits in Brazil to preserve the rainforest, and utility regulations to save energy.[126] This technique of manipulating economic reasoning to lead students to certain conclusions is not education. Students need to have a basic grounding in economic concepts and principles, as contained in the *Environmental Economics* text, in order to decide for themselves whether such policies or other recommendations are beneficial to the environment.

4. Normal standards of scholarship, which require citations for data and opinions taken from other sources, are almost entirely missing from these teacher education materials.

According to the NAAEE *Guidelines*, "Data are drawn from current and *identified* sources of information. (Knowing the source of information can aid in judging its trustworthiness or identifying possible bias.)"[127] (emphasis added) This guideline is almost uniformly violated in the materials reviewed for this study. Of the nine standard textbooks reviewed, only one — again, *Environmental Economics*[128] — provides standard source citation. Others offer the reader chapter bibliographies and suggested readings, but these do not allow the student to trace a statement or a presentation of data back to its source.

This is a violation of both the NAAEE *Guidelines* and the commonly accepted standards of scholarship. Prospective teachers are required to accept the authors' statements and data without knowing the sources from which they come. Without citations to help prospective teachers assess possible bias, they can neither exercise their critical thinking skills nor help students develop theirs.

Teachers who want to use these EE materials to help their students understand complex environmental issues are faced with an interesting double standard. Most teachers require students to cite sources in their research papers. What do these teachers say to the student who correctly points out that the author of the text he or she is using does not practice that standard rule of scholarship?

5. These EE materials largely fail to transmit to prospective teachers the educational responsibility and ethics for educating, rather than propagandizing, students.

The NAAEE *Guidelines* require that factual information in EE materials must be presented in "language appropriate for education rather than for propagandizing." This specific reference to educational ethics is supported by the tone of the entire *Guidelines*. The *Guidelines* require materials to present a range of perspectives in a balanced and fair way.

The materials used in these teacher education courses sometimes give lip service to this responsibility, but too often fail to follow through. The Wisconsin *A Guide to Curriculum Planning in EE* reiterates this point. Teachers "must be careful to educate rather than indoctrinate." Students must be taught in ways that help them learn "how to analyze the merits of the many and varied points of view usually present on a given environmental issue ...." It is the teacher's responsibility, according to this *Guide*, to be "familiar with all sides of issues, stand firm for the right of each advocate to be heard, and provide a neutral atmosphere in which informed debate may take place."[129] Unfortunately, these admonitions take place on one page of a 167-page document. Throughout the other 166 pages are examples that contradict these assertions.

This pattern of providing lip service to educational ethics is also evident in the Cunningham and Saigo text, *Environmental Science: A Global Concern*. They state that "[w]e attempt to present relevant information and teach essential skills to allow students to analyze and discuss these challenging issues while forming their own opinions about what should be done."[130] The authors then go on, though, to emphasize sustainability and do not permit students to form their own opinions about this concept.

Other texts do not even pay lip service to educational ethics. The texts reviewed for this report by Miller and Nebel and Wright openly attempt to enlist future teachers as soldiers in the environmentalist crusade. They seemingly want teachers to ignore educational ethics and responsibilities and become, like them, advocates for their narrow brand of environmental ideology. Nothing could be more damaging to the spirit of education and to parents' confidence in the educational system.

To adequately transmit educational ethics to future teachers, EE materials must not only state the goal, *they must demonstrate it in practice*. Coverage of controversial environmental issues must include a neutral discussion of scientific and economic debates. The various scientific methods and tools used to explore these environmental issues should be presented in ways that enable students to learn their strengths and weaknesses. Students must have enough balanced and unbiased information that the critical thinking questions at the end of a chapter truly stimulate critical thinking — not, as so many do now, lead students to predetermined conclusions. Advocacy for environmental solutions and causes must be replaced by an academically rigorous and unbiased application of the social sciences, especially economics and political science.

RECOMMENDATIONS

The findings of this report provide an opportunity for Wisconsin to once again take the lead in environmental education. Wisconsin citizens, elected officials, and educators need to recognize that establishing top-down requirements for quality environmental education is not enough. Most public-policy experts recognize that there is a great distance between the establishment of statewide goals and objectives and what actually happens at the grassroots level. In this case, the admirable goal of requiring prospective teachers to be adequately trained for their responsibilities for teaching quality environmental education in the K-12 classroom is, for the most part, not being implemented.

Wisconsin's elected and administrative officials, educators, and citizens should redouble their commitment to balanced, fair, and accurate environmental education that educates, but does not indoctrinate. Of particular importance are efforts to set and communicate expectations regarding quality environmental education. Those delivering environmental education to prospective teachers in the state need to know what is expected regarding fair and accurate coverage of environmental issues. In addition, accountability mechanisms need to be put in place.

The following non-comprehensive list of suggestions should be considered.

1. Establish clear expectations for balanced and objective environmental education for future teachers. (Arizona's EE statute states that all environmental education programs must be "conducted in a balanced manner" and "are based on current scientific information.")

2. Adopt the NAAEE *Guidelines* for "Fairness and Accuracy" as a basis for evaluating balanced and objective teacher training in environmental education. (Arizona has adopted a modified version of these guidelines as part of its EE grant program.)

3. Clarify and spend more time informing prospective teachers of their ethical responsibilities when they engage in teaching about lifestyle issues and in civic action. Future educators should know that it is their ethical responsibility to allow students to "explore different perspectives and form their own opinions." Political advocacy and political training that leads to political activities in favor of environmental advocacy are clearly not part of a responsible environmental education program.

CONCLUSION

This study shows that in the preparation of future teachers in Wisconsin, the NAAEE *Guidelines* for fairness and accuracy are often violated. As a result, prospective teachers do not receive the information they need to help students understand and evaluate complex environmental issues. Teachers need to understand and be able to transmit basic science concepts, including information about evolving research. If teachers are going to prepare the next generation to deal intelligently with environmental problems, they need to be knowledgeable about various theories and the evidence that confirms or contradicts them. Discussions of possible solutions to environmental problems should include their economic ramifications and the trade-offs they involve. Wisconsin teachers would be better prepared to perform these important tasks if the EE materials that they are required to use concentrated more on science and less on behavior modification, environmental activism, and political advocacy.

Developing an environmentally literate citizenry that is capable of dealing intelligently with environmental issues is important. The environmental education that teachers receive, in large measure, determines whether students are prepared for that responsibility.

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About the Institute

The **Wisconsin Policy Research Institute** is a not-for-profit institute established to study public-policy issues affecting the state of Wisconsin.

Under the new federalism, government policy increasingly is made at the state and local levels. These public-policy decisions affect the life of every citizen in the state. Our goal is to provide nonpartisan research on key issues affecting Wisconsinites, so that their elected representatives can make informed decisions to improve the quality of life and future of the state.

Our major priority is to increase the accountability of Wisconsin's government. State and local governments must be responsive to the citizenry, both in terms of the programs they devise and the tax money they spend. Accountability should apply in every area to which the state devotes the public's funds.

The Institute's agenda encompasses the following issues: education, welfare and social services, criminal justice, taxes and spending, and economic development.

We believe that the views of the citizens of Wisconsin should guide the decisions of government officials. To help accomplish this, we also conduct regular public-opinion polls that are designed to inform public officials about how the citizenry views major statewide issues. These polls are disseminated through the media and are made available to the general public and the legislative and executive branches of state government. It is essential that elected officials remember that all of the programs they create and all of the money they spend comes from the citizens of Wisconsin and is made available through their taxes. Public policy should reflect the real needs and concerns of all of the citizens of the state and not those of specific special-interest groups.

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